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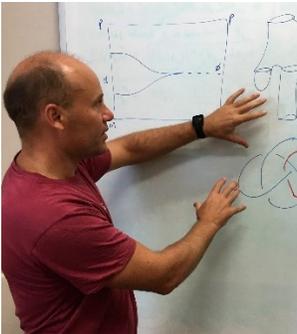Theoretical and Computational Sciences**

NITheCS Colloquium
Monday, 9 May 2022, 16h00 – 17h00
Dr Bruce Bartlett (Stellenbosch University)

'The geometry of the classical and quantum 6j symbols'

ABSTRACT

The classical 6j symbols are real numbers which mathematically encode the 'associator' information in the tensor product of representations of SU(2). Similarly, the quantum 6j symbols encode this information for representations of the quantum group of SU(2) at a certain level. They form the building blocks for the Turaev-Viro 3-dimensional topological quantum field theory.

I will review the intriguing asymptotic formula for these symbols in terms of the geometry of a Euclidean tetrahedron (in the classical case) or a spherical tetrahedron (in the quantum case), due to Ponzano-Regge and Taylor-Woodward respectively.

There is a wonderful integral formula for the square of the classical 6j symbols as a group integral over SU(2), and I will also report on investigations by my PhD student Hosana Ranaivomanana into a similar conjectural integral formula for the quantum 6j symbols.

BIOGRAPHY

Bruce Bartlett is a Senior Lecturer in the Mathematics Division at Stellenbosch University. His research area is low-dimensional topology and mathematical physics, with a focus on topological quantum field theory.

After initially training as a theoretical physicist (two Masters degrees, from Stellenbosch University and Utrecht University, Netherlands) he switched direction to pure mathematics and obtained his PhD in pure mathematics at Sheffield University.

He later spent three years as a postdoctoral research fellow in the topology research group at Oxford.

During his time at Stellenbosch, he has successfully supervised several MSc and PhD students, with three currently in the mix. He is also excited about math outreach, with stints on radio and television, travels to Kenya, the African Mathematics Seminar, DAAD scholarships for African students and various courses taught at the African Institute of Mathematical Sciences.

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